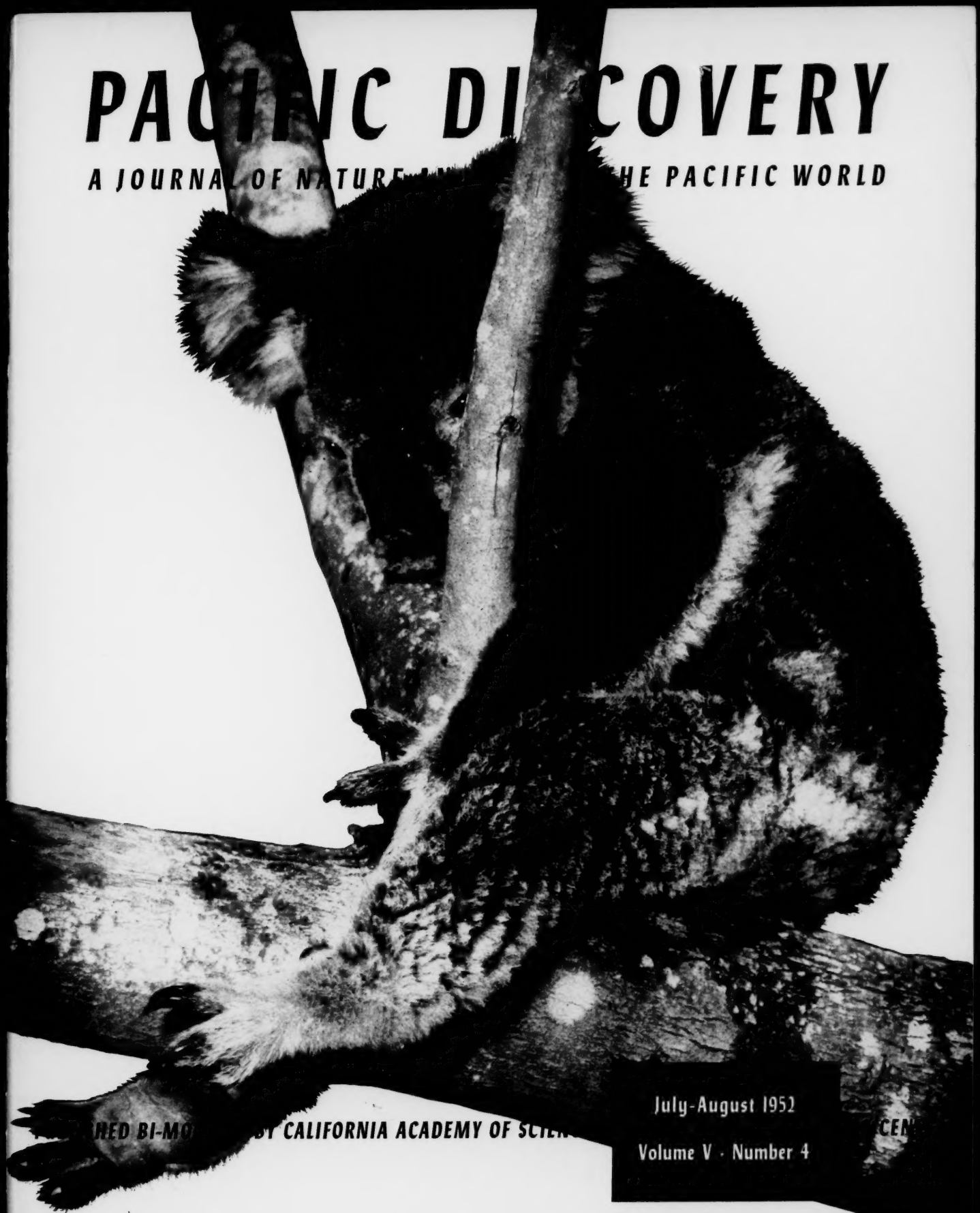
PACIFIC DISCOVERY

A JOURNAL OF NATURE AND THE PACIFIC WORLD



PUBLISHED BI-MONTHLY BY CALIFORNIA ACADEMY OF SCIENCES

July-August 1952

Volume V · Number 4

africa

SHOWING ROUTE OF THE CALIFORNIA ACADEMY OF SCIENCES
ENTOMOLOGICAL EXPEDITION
OF BORYS MALKIN 1948-50

Tiger beetle *(above, enlarged × 2)* from the Angolan desert is *Mantichora latipennis*.
(Borys Malkin, collector. C.A.S. photo by Edward S. Ross)

A JOURNAL OF NATURE AND MAN **PACIFIC DISCOVERY** IN THE PACIFIC WORLD

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Vol. V · No. 4
July-August
1952

PRE-DISCOVERY

A FIRST riffling through this issue may lead to the inference it's another "special" — Mammals, Ancient and Modern, or Wild Animals I Have Known in Flesh and Stone. Most of the reaction we have had, so far, from readers and other critics has been heavily in favor of the special issues. Nevertheless, we shall live up to our promise that there will continue to be issues of more general interest — a very articulate minority, of proven competence in judgment, has spoken out vigorously against the specials as a firm policy. For our part, we still regard the special issue idea as experiment, not policy. We need more discussion from the floor. For the present, may we assure the minority voice that this is not a special issue!

Whether or not our next will be the promised Planetarium Number is still in the lap of Vulcan and his mechanical assistants — designers, draftsmen, instrument makers, optical and electronics experts, and sundry other specialists — who have been working at least eight days a week for months past, in the Academy Shop somewhere beneath the editorial office. Wisely, they make no promises, but the signs of progress have been audible. The great Planetarium auditorium is just the other side of our wall. For several weeks past we, unseen, have enjoyed the installation and trial of the elaborate sound system operated from an organ-like console. There has been a minimum of "Testing . . . one . . . two . . . three . . . four." Dr. Hanna's staff are not a grim, unimaginative crew — we have, rather, been appropriately regaled with recordings of *South Pacific!* In fact, *PD* has come very close, this past spring, to losing an editor — but the penalty of our chair is that Pacific discovery is for ever a vicarious pleasure. . .

DISCOVERING PD'S AUTHORS

LAST FEBRUARY **Carl W. Kenyon** wrote us that he expected to be in the field for the next six months, not in the Pribilofs, his usual stamping ground, where he wrote about "The Steller Sea Lion," but in Japan. We believe he has been assigned by the U. S. Fish and Wildlife Service to a research project in aid to the Japanese fisheries, thus helping to put our recent charges back on a self-sustaining basis, fish being one of Japan's two principal foods. . . . ¶ As General Curator of the Zoological Society of San Diego, **Ken Stott, Jr.** was working chairman of the welcoming committee for those "Aussie Ambassadors." At any rate, he had to take the four koalas in charge, on arrival, and see to it they enjoyed the best of the San Diego Zoo's carefully planned hospitality. The painstaking efforts of the Curator and his staff should provide assurance that the little Australian representatives will be San Diego's chief tourist attraction for as long as nature intends them to live. . . . ¶ The 1950 expedition of Colombian and University of California paleontologists not only unearthed the greatest collection of northern South American fossils ever assembled, but also proved that "Colombia is the Key to American Vertebrates," as **Dr. Donald E. Savage** has shown in his brief article. Since the field days, Dr. Savage, who is assistant professor of paleontology and curator in the Museum of Paleontology on the Berkeley campus, has been continually working at the task of getting the results into publication in the technical journals. One field trip can tie a scientist down with homework for years! . . . ¶ "Africa South," east, or west, **Borys Malkin** is already plotting a return to that continent, though for this summer he is having to content himself with the wilds of Idaho, where he is collecting material for the book that his boss, Dr. Melville H. Hatch of the University of Washington, is writing on the beetles of the Northwest. D.G.K.

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THE COVER COPY

MEET the new Ambassador from Australia, who has recently presented his credentials at the San Diego Zoo! "He" is *four* of those living Teddy bears, the koalas, from southeastern Australia, recently given to us by the Australian Government in a gracious act of international good will. Ken Stott, Jr., author of our story beginning on page 14, took the San Diego Zoological Society photographs.

PACIFIC DISCOVERY is published bimonthly at Gillick Press by the California Academy of Sciences. Publication office: 2057 Center Street, Berkeley 4. Editorial and Advertising offices: Golden Gate Park, San Francisco 18. Subscriptions: $3 per year; single copies: 50c. Members of the Academy subscribe through their dues. Entered as second-class matter, February 17, 1948, at the Post Office, Berkeley 4, California, under the act of August 24, 1912.

AN EDITORIAL HOLIDAY: Northwest Pilgrimage

THERE IS NO CLAIM ON RECORD that "nearly everybody reads *Pacific Discovery*"* – but we offer proof here that at least the editor reads it. For, with the first copy of the beautiful and unusually interesting (please excuse us, but a good many people have told us so) Northwest issue in our hands, the ink scarcely dry, we were suddenly seized with a compelling desire to revisit the towering land it pictured. Our blue pencil had all but forgotten the feel of good roap-map bond, but the suspicion was soon unavoidable that – *next* issue or no – *PD*'s editor was planning a "field trip."

Our wife being also quite susceptible to these things, almost before we knew it the yearling daughter had been farmed out to grandparents, the aged car had been loaded with *PD*s and gear, and on June 3 we, with the road-happiest 7-year-old boy in the Far West, were headed for Mt. Shasta and points north.

Whether or not the Shasta country is conceded part of the Pacific Northwest, the great Shasta Dam and its volcanic titan namesake were fully fit curtain raisers for the sweeping scenes to come. What better symbolizes the whole region than either a giant hydroelectric project or a forest-footed solitary mountain colossus whose blue-white shroud haunts the horizon for a hundred miles coming and going? Shasta, Bonneville, Grand Coulee; Hood, Adams, Rainier, Baker – the word Northwest fairly leaps to the tongue. Shasta the dam had spilled over for the first time in its life on May 15. Shasta the mountain told us why: its unsullied snow mantle promised high water in the vast new lake well into the summer.

Snow was near enough, on the road from Fort Klamath to the Crater Lake checking station, to be taken posteriorly in baseball-size pellets – giving us a double reason, once the hush of the rim was reached, to impress it upon our young that here was one of earth's sublimest sights. Our previous visits to this spot had been in height-of-season. This was a new experience; a single pathway had been cut through the snow, still second-story high, to the viewpoint beside the unopened hotel. Even a hopeful Clark nutcracker disturbed the stillness no more than a feather falling on velvet.

Ordinarily we are back-road, city-bypassing travelers. This time, as drummers of sorts, we had plotted our route to call upon as many as time allowed of the Northwest's city bookstores – specifically, those with magazine stands. So we left the Bend road and took Oregon 58 over Pengra Pass, down Salt Creek with its spectacular waterfall and the Middle Fork of the Willamette where the Lookout Point Dam construction is changing landscape on a big and typically Northwestern scale. In Eugene we came up against a certain manifestation of Northwestern independence that, while admirable, can be deucedly inconvenient to a stranger, especially if he wants to do business. We never got past the twilight zone of understanding the intricacies of local option and sheer rugged individualism in the application of (R.C.M. please note*) Daylight Saving Time in Oregon and Washington. Either one or both states are officially on PDT, or maybe Pacific Standard, but any city, county, firm, institution, or individual has the inalienable right to pursue life, liberty, happiness, or the fleeting hours according to his, or its, own (day)lights – no questions asked, no quarter-hours given, and don't shoot till you see the whites of their watch-faces. A few localities, we were told (maybe a local type of tourist-ribbing), had negotiated some sort of truce with their neighbors – perhaps laying down all their timepieces along their respective sides of the nearest parallel, removing the alarm mechanisms, and resetting the time on the half hour between PST and PDT.

At any rate, we often found our hands tied, and no escapement, trying to coördinate overnight stops, meal stops, and business-hour calls on libraries and stores. We hit Eugene an hour later than we thought and worked frantically against closing time; we reached Salem an hour too early – but this gave us time for a very pleasant visit to the State Library.

The lower Willamette Valley is the lush green of New England farm lands. Portland is an ugly and upright New England industrial city, but with oases in its desert of aging industrialization. A short jump from a bleak and crowded woollen mill, where our wife never fails to stock up for the next Five Year Knitting Plan, lies the lovely, well-spaced campus of Reed College. Here, at the suggestion of San Francisco bookman David Magee, we stopped to see the affable and able young manager of the student book store, Dick Abel. An unexpected additional pleasure was meeting Dr. Lloyd J. Reynolds, professor of literature, who has played a leading role in making Portland the graphic arts center of the Northwest – a logical outgrowth of that city's cultural leadership. After ten years of devoted spade work, Dr. Reynolds has a flourishing graphic arts course and workshop in the college and has aroused the interest of persons and groups throughout the metropolitan area. As always when printers meet, we swapped ideas and aspirations with Dick Abel and the professor, private press plans and hopes – we of the Feathered Serpent Press, they of the Champoeg Press, appropriately named for the historic meeting that gave the Northwest its first organized government.

*Apologies to *The Philadelphia Bulletin*.

*Cf. "Night Saving Time" (editorial), *PD*, July-August 1950.

We would most happily have spent more time in Portland's oases, but, various dealers having relieved us of many copies of our Northwest *PD*, we hurried on up the Columbia to enjoy, by invitation, the hospitality of one of our issue's authors.

The twin cities of Bingen and White Salmon, Washington – up river from the Bonneville Dam – were buzzing like their own sawmills with preparations for the coming week-end pageant, "The Mount Adams Story." For the occasion, and to celebrate its own centennial, Bingen's newspaper, the *Mt. Adams Sun*, reprinted in full Ray M. Filloon's "Huckleberry Pilgrimage" from *PD*'s Northwest number. Editor Bernard Pollard was out on pageant business, but his colleague, Leon W. Berry, greeted us most cordially. Mr. Filloon awaited us in his cabin above Trout Lake, the road's end community of an enchanting pastoral valley 25 miles up the White Salmon River.

As we topped the Columbia's bluffs where White Salmon perches, we caught that city's towering view of Mt. Hood across the river. A few miles more and Adams suddenly rose to challenge his rival, taking over, by midpoint, through sheer mass. Architecturally, Hood is a pyramid, Adams a dome. The sunny morning and matchless view were fit prelude to the experience ahead, in which for the next 24 hours we were welcomed guests of as genial and considerate a host as ever graced a wayfarers' road. With Ray M. Filloon, forester, raconteur, trusted friend of the Indians, guide, and veteran of the Northwest, we were completely at home in the Mt. Adams country. Incidentally, he is a corking good cook! It was not easy to hit the road again.

After Yakima, booming agricultural center, we sailed on splendid road up the bottom of a deep river gorge until we curved sharply out to the snow packed 5,440-foot summit of Chinook Pass. All at once, with no forewarning, Mt. Rainier filled our vision. Nine thousand of its 14,408 feet confronted us directly, from across a snow filled swale. Flanking ranges, themselves big mountains, were utterly dwarfed, their dark, naked crags the perfect foil for Rainier's unearthly whiteness. No great mountain view in the United States – we have seen most of them – in our opinion surpasses this of Mt. Rainier from Chinook Pass on a brilliant day in June.

In an incredibly short time we emerged from the forest to enter the streets of Seattle. Now this statement implies that Seattle is a city but recently carved out of the wilderness, and looks it. It is. It does – and we mean no insult. It would not have strained our imagination to have been told that the "Queen City" had been conceived and executed by titan builders who had first pushed the Olympics oceanward to form a harbor (Puget Sound), then had shoved the Cascades a bit farther east to make a shelf of land at the edge of which they trampled a clearing in the woods; in their energetic haste they had kicked out Lake Washington and piled up the earth from it to make Seattle's hills. Anyhow, the scene is composed of just four elements – buildings, mountains, trees, and water. (A fifth, clouds, is commonly present, but then mountains vanish; we had a grand panorama of the Olympics one of our three days in Seattle, the rest of the time they did not exist except as wishful emotions.)

On the University of Washington campus we discussed with Borys Malkin his last African chapter (in this issue), looked up William B. (now Dr.) Sanborn, our "Fossil Forests of the Yellowstone"* author, and saw for ourselves, in the State Museum, a vast amount of the Northwest Coast Indian art discussed in our last issue. As for that Northwest number, we found it doing well at the University Book Store.

On a side trip to Tacoma we had our last glimpse of Rainier – or was it a mystic illusion? For those stupendous volcanoes that dwell apart from other mountains have achieved the trick of levitation. Blue haze blending perfectly into sky made Rainier a spirit thing, detached from earth, a self-controlled jinni, incredibly tall.

We have friends not far from the U. of W. campus, the Eastons, who, when we visit them, outdo the Chamber of Commerce in their efforts to convince us we should move to Seattle. When they come down to San Francisco Bay, naturally it's our turn. It is our philosophy to call the spot we live in good, but also to enjoy in full the place where we happen to be. This was easy in Seattle – especially with good friends – but we still had two major Northwest objectives and time was on the run. Whatever tears we shed at parting were at once absorbed in the general downpour. This stayed with us all the way to Anacortes, through the San Juan Islands to Sidney on Vancouver Island, and down to Victoria. (It was worth a wetting to stand on the ferry deck and see the ingenious San Juan Islands method of raising the aprons – a long way up at low tide – by means of the power in an electric hand drill with a gear attachment.)

One of our purposes in Victoria was to meet another of *PD*'s Northwest authors, Dr. G. Clifford Carl, but we learned at the Provincial Museum that the Director was away on another island field trip – not Triangle, this time, but the Queen Charlottes. We had failed to remember from visits in years past to Montreal, Toronto, and other points across the border that on Wednesday afternoon Canada closes shop. Museums and eating places are open, but no stores (this information is thrown in gratis for prospective tourists). Open or shut, Victoria needs much more than 24 hours of anyone's time, but thoughts of the next issue were beginning to plague our sleep. Most

*PD, May-June 1951.

(Concluded on page 32)

The Steller Sea Lion

KARL W. KENYON

Photos by Author unless otherwise credited—*courtesy U. S. Fish & Wildlife Service*

A WET WIND WHISTLED in our ears and muffled the distant pounding of breakers on a rocky shore. Swirling fog cut our visibility to a few yards and the moisture laden lupine and rye grass through which we tramped drenched our clothing. As my several Aleut companions and I approached the beach a new sound rose above the thundering surf. It was a chorus of animal voices, which blended eerily with the hissing wind and breaking waves. Soon we distinguished throaty grunts and bellows above the background of lesser sounds and we knew that we had found our way to St. Paul Island's only breeding colony of Steller sea lions.

Ghostly forms emerged from the whiteness along the crest of the steep cobblestone beach ahead. In profile, like giant animated gum drops, massive bulls swayed from side to side as they rumbled a challenge to a neighbor or lumbered over the rocks to drive an invading bull from jealously guarded territory. It was late June and activity was at its height in the sea lion colony. Around each bull clustered a half dozen or more cows, each with her single chocolate colored pup. The tawny yellow-brown adults contrasted sharply with their dark young.

All the way from the large breeding colonies that gather each spring in the Bering Sea south to

↑ Monarch of the sea lion rookery — this prime bull held his ground and charged the photographer although his harem of cows and the less virile bulls sought refuge in the sea.
→ Part of a breeding colony on Walrus Island of the Pribilof group. Ivory hunters killed its last walrus in 1891 — now a vast throng of sea birds and over 1,000 sea lions cover every foot of this islet each summer during the nesting and breeding season. It is about three quarters of a mile long and 200 yards wide.

a small colony on one of the Channel Islands off southern California, the Steller sea lion occupies islets and remote rocky shores along the Pacific Coast. In the southern portion of its range it overlaps the habitat of its smaller and more widely known relative, the California sea lion. Along most of its range the Steller sea lion remains well away from the usual haunts of man and is seldom seen except by the offshore fisherman or the inquisitive naturalist. A few surf-washed rocks, such as Seal Rocks near the Golden Gate and the Sea Lion Caves of Oregon afford the general public a view of these ponderous marine mammals.

Fishermen complain bitterly about the damage inflicted on their means of livelihood along the entire range of the sea lion. They often tell us that the Steller sea lion is an expensive as well as an exasperating nuisance around certain fishing areas. An experience related by Henry Jorgenson of his encounter with a small herd of sea lions off the Washington coast graphically illustrates why fishermen have a certain antipathy toward the animals.

Jorgenson had worked his troller hard all day and by late afternoon had a load of salmon, many of them piled on deck. He was tired and the weather calm, so he decided to anchor out for a while and take a well deserved nap. Suddenly the violent tossing of his troller brought him to his feet. His first thought was that a sudden storm had come up. A glance at the sea assured him, however, that no conventional storm had struck – the sea was still calm. On deck it was a different matter. Flapping their leathery flippers at him from the gunwales were two large sea lions bent on climbing aboard. Jorgenson reached for the only weapon at hand, a metal-tipped pike pole and with a few jabs dislodged the animals and they swam away, apparently discouraged. Thinking his troubles with the marauders were over, Jorgenson returned to his bunk. He had no sooner dozed off than he was again aroused. This time, he claims, he found a bellowing herd of eighteen sea lions fighting for a flipper hold at the gunwales. He used the pike pole as before and prodded the bulky creatures but their thick hides, well adapted to breeding-ground battles, seemed immune to injury. For an hour and fifteen minutes, he says, he struggled to keep the animals at bay. He was about to give up the battle through utter exhaustion and sacrifice his catch when a final thrust dislodged a twelve footer that had actually succeeded in climbing aboard. This battered individual, now finally discouraged, swam away and the others followed him.

Such incidents as this one are extreme and rather rare but other fishermen have reported similar ones. Not infrequently though, the sea lions choose a less aggressive method of robbing fishermen. A few animals will habitually loaf about a good fishing area. When a fisherman is retrieving his set lines or trolling, a sea lion will follow some distance behind, then dive below the surface to jerk fish from the hooks while they are

Two battle-scarred Steller bulls fight for a desirable spot on the breeding ground. As they spar for a hold each keeps his fore flippers as far back as possible to prevent the other from getting a crippling hold — if the muscles are torn near the base of a flipper the limb becomes useless and the injured bull is forced to retire. Although the sea lions have strong, sharp teeth and powerful jaws, their tough hide generally saves them from mortal wounds.

still some distance from the boat. The animal then retreats to a safe distance before surfacing to devour its stolen meal. Habitual pests of this type develop a keen sense of the danger of guns and take care to appear at the surface well away from the fishing boat they are robbing.

Last summer a Pribilof fisherman told me of an encounter with a sea lion: "I had just hooked a good sized halibut on my hand line and was pulling him up when the line was jerked out of my hands. Then suddenly it was slack. A few seconds later an old bull sea lion came up with a big hali-

but in his mouth — it must have weighed nearly thirty pounds. The sea lion shook his head and tore a big piece from the fish. After he had eaten this he got the halibut again and ripped off another bite. He ate almost all of the halibut, then swam away." Oddly enough, fishermen around the Pribilofs are rarely bothered in this manner by the sea lions, and in answer to my inquiries no one could recall a similar experience with the numerous fur seals about the islands.

But to return to the breeding colony on the rocky beach. When we first arrived we were impressed by the apparent bedlam and confusion among the animals. Pups crawled about confusedly among their elders and the cows moved restlessly about keeping tab on them, while here and there bulls fought or challenged one another. Yet after watching the animals for some minutes it became evident that the noisy, restless throng had arranged themselves according to a certain basic pattern. Within the colony proper the huge bulls of 2,000 pounds or so were spaced at quite regular intervals, so that among them their respective harems of cows, each cow weighing about 500 pounds, or more, were clustered somewhat apart. bodies bore many old scars of combat as well as fresh ones. They had passed their prime and had been driven from the harem area by more virile younger animals. Most of the pups were newly born and weighed in the neighborhood of 35 to 40 pounds. Some of their mothers had rushed away toward the sea at our approach leaving their youngsters to look out for themselves. One mother, more concerned than the others, carried her pup into the water with her. She held him dangling and bleating frantically in her teeth as she lumbered over the boulders into the breakers. She might better have left her pup behind on the beach, however, since a young sea lion swims weakly at best before he is over a month old. This little fellow was tumbled back to the beach by the first wave that caught him and he retreated in a panic from the water. If such a newborn pup is carried by its mother into deep water, as sometimes happens, the little fellow will soon weaken and drown unless its mother returns to help it back to dry land. The pups exist exclusively on their mother's milk for about the first three months of their lives. By the end of the nursing period they have learned to swim well enough to begin fishing

Seizing his chance, one bull makes a lightning lunge, sinks his two-inch canines into the other's tough hide, then strains every muscle in an effort to inflict a disabling wound. But the other's flexible hide merely stretches and he gets off with a superficial skin wound.
Exhausted, but otherwise little the worse for wear, they rest cozily to regain strength for another round. The less virile one is finally driven to the edge of the area.

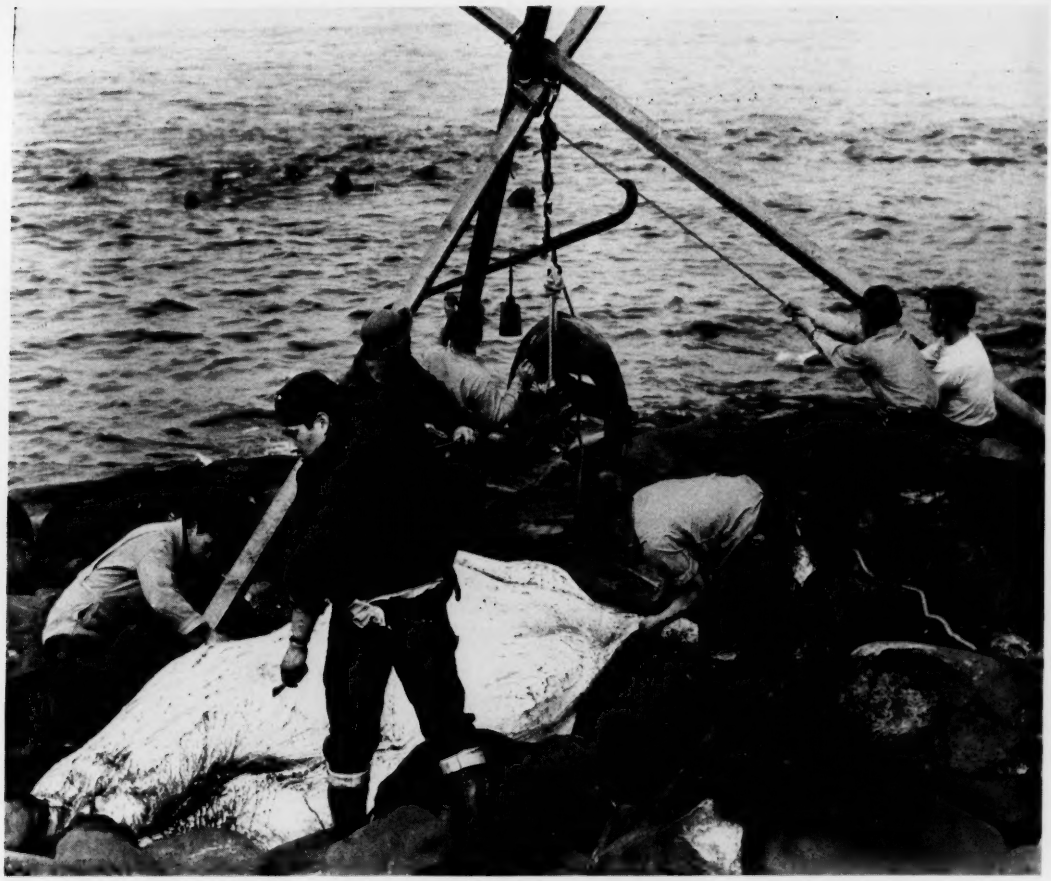
Gathered around the fringes of this assembly of family units were the young males, perhaps six to eight years old, nearly mature but not yet strong enough to compete with the fully adult males that held the harems. There too were the very old bulls. Their teeth were blunt and broken and their

Three Pribilof Aleuts show the size of a 10-foot bull killed for experimental study.

for themselves but even when weaned they often remain with mother until her next pup is born the following spring.

For some time my Aleut companions and I stood fascinated by the activity along the beach. But we had not made this trip as sightseers. We had come to take a large bull which would be used for experimental studies. In answer to the repeated pleas of fishermen we hoped to find a useful commercial outlet for sea lion leather, so that a wise system of control could be established which would limit the numbers of sea lions in areas where they interfere with fishing activities. In response to the requests of fishermen's groups, the laws protecting the Steller sea lion in Alaska waters, except those surrounding the great sea lion refuge on Bogoslof Island, were lifted on April 7, 1949. To the present, however, no program of sea lion control has been undertaken.

Sea lions were killed in great numbers during the late years of the last century and the early years of this one. They were killed both as predators and, to some extent, for commercial use. During this period the sea lion population was greatly reduced. A Canadian firm on Vancouver Island manufactured heavy gloves and leather boots from their hides, and oil was rendered from animals taken off the Rogue River. At that time too, there was a demand for the tough and flexible whiskers, which were used by the Chinese as pickers for their opium pipes. More recently sea lion meat has been used to some extent as feed for fur farm animals along the Alaska coast. During recent years other more satisfactory products have rendered impractical the commercial use of the battle-scarred sea lion hides and fur farming in Alaska has been much reduced. The industries which were at their height about 1884 dwindled steadily until 1915, when commercial exploitation ceased. Unlike the California sea lion, which is often captured and highly valued as a show animal, the Steller is never trained as a circus performer and



A yearling is hoisted on the steelyard while the 2,069-pound bull is being dismembered for weighing.

is seldom captured for zoos. It grows too big and is too bad-tempered. One that lived for several years in the San Diego Zoological Gardens was so aggressive that his keeper ran a grave risk when he entered the pen to clean it. Since the sea lion has a rather long life span of perhaps twenty years (one zoo animal was kept on exhibit for seventeen years) and few natural enemies, the animals, when not molested by man, increase rapidly. Today the Fish and Wildlife Service estimates that more than 50,000 inhabit Alaskan and Canadian waters.

When we had approached to within about fifty feet of the nearest bull holding a harem, he suddenly turned from his group of cows and, bellowing and snorting, charged down upon us. In spite of his great bulk, which we later found tipped the scales at 2,069 pounds, he lumbered over the rocks as fast as any of us could run.

"He looks like a good one to get, he's as big as any," shouted Tracey Mandrigan, who held the rifle. After we had retreated, the charging bull stopped, wheeled about, and returned to his chosen spot on the breeding ground. By now most of his cows had escaped and fled to the water, and when he again turned in our direction to charge it was an easy matter to drop him with a slug from a .30 caliber rifle. Because of the sea lion's heavy hide and dense layer of blubber and muscle that protect his vital organs, it is necessary to shoot an animal through the head for a quick kill.

Our combined efforts failed to roll this great beast over. Only after we had anchored a block and tackle to a large boulder were we able to lay him out on his back, so that we could remove his hide and dismember his carcass to weigh in sections. His skin, with much of the blubber removed, weighed nearly 250 pounds and filled a good sized barrel.

Sea lions, being wary animals while at sea, especially after being shot at several times, should be controlled on their breeding grounds if a program is to be most effective. Their breeding

grounds are well known, being used consistently year after year. Thus the taking of young animals should offer the most logical approach for controlling the size of the various herds along our coasts. For this reason we returned the following day and took fifty pup skins. These were later found to be useful to certain natives of Alaska in the manufacture of garments.

Although the Steller sea lion is often accused of eating so many food fish that it menaces the fishing industry, we still know comparatively little of its feeding habits. Stomachs for food analysis are difficult to obtain. When the animals come ashore on their breeding grounds their stomachs are usually empty. When they are killed at sea they quickly sink. However, of those that have been examined, most contained squid, herring, and various scrap fish, among them small sharks, skates, and perch, all of little commercial value. One I killed on a Pribilof beach, where halibut are quite available, contained mostly sand lances (a small fish of no commercial value) — over 400 of them.

Undoubtedly sea lions do take salmon near the mouths of rivers at spawning time. Sometimes the animals enter a salmon trap where they are seen eating salmon. Even in such areas, however, their presence may be deceptive. During a salmon run at the mouth of the Klamath River a cannery manager shot a sea lion which, he of course assumed, was eating the fish as they entered the stream. The animal later drifted ashore and when Dr. J. O. Snyder of Stanford University examined it he found that the stomach contained only lampreys. Since the lamprey is a parasitic fish, attaching itself by means of a rasp-lined sucking disk to the sides of other fish, literally eating them alive, the sea lion in this particular case was actually doing the fisherman a good turn. The lamprey has become a very serious menace to the fishing industry in certain areas.

The resilience of a population of sea lions is well illustrated by the colony that we visited on St. Paul Island. During the early years of the present century this small colony and the much larger one on Walrus Island nearby were almost wiped out by over-exploitation. For many years the sea lion skins were used to cover the wooden frames of bidarras, the extremely seaworthy boats about 40 feet long used by the Aleuts. For the past thirty years canvas has served as a more practical covering and the sea lion has been left in peace except for the few that are annually hunted and killed for food by the Aleut villagers of the Pribilofs. Today the colony on St. Paul contains several hundred animals and the one on Walrus Island is a seething mass of sea lions that number in the thousands.

A ton of muscle, gristle, and blubber takes to the air from an 8-foot bank, to land unhurt on hard packed sand and rocks. These tough animals seem immune to injury. (Dick Bolding)

Gathering sea lion hides for the bidarras was no easy job. "In the early days we worked hard up here," John Fratis, an old-timer on St. Paul Island, told me. "We didn't have canvas to cover our boats and we had to get the sea lion skins. We didn't have trucks to go and get them like the boys have now. We had to hike to Northeast Point and then drive the sea lions twelve miles back to the village. It was hard work and it took a couple of days, sometimes more, to bring them in. We would go out on the rocks early in the morning when it was dark and we would yell and shoot guns and scare the sea lions away from the water with white umbrellas and throw rocks at them. The sea lions are fat and heavy and they would not go very fast. They would go better at night when it was cool. Sometimes we would drive them through the water at Big Lake and they would go faster there, but it took a long time to get them back to the village." Near the village the animals were slaughtered; after the skins were removed for boats the choice cuts went into the villagers' stew pots.

As a matter of fact the Aleuts wasted very little of a sea lion in the pre-Sears-Roebuck days. The intestines were removed, washed, then stretched out and inflated with air. When they were dry they were cut open and the strips thus made, about three inches wide and up to 200 feet in length, were sewn together to make rain coats. The lining of the throat or oesophagus was dried for boot tops and the heavy leather from the palms of the flippers became boot soles. The dried, distended stomach served as a container for the cooking oil rendered from the blubber. Manufactured articles ordered from the States have long since outmoded the more picturesque but less fancy products of the sea lion.

Sea lion meat was once a more important item in the diet of the Aleuts than today. Now sea lion and seal meat are supplemented by other food brought in by a government supply vessel. Sea lion meat, especially from young animals a year or so old, is quite good. After several meals of it, I can recommend it favorably, although it will undoubtedly never compete with beef. In texture the meat of a yearling is similar to that of veal but the flavor is somewhat gamey. The liver, on the other hand, is quite indistinguishable from calf liver.

How deep will a sea lion dive? We are often asked this question, so I have put it to various fishermen. "I know it is more than 100 feet because they take fish off my line when it is down at least that deep," an old Norwegian fisherman told me. Herman Kitka, a Tlingit Indian who lives at Sitka, gave more specific information. "I have fished halibut here off the southern tip of Baranoff Island for many years," he said, pointing to a pencil line on a much used chart that he had spread out in the pilot house of his boat. "The water is 60 to 80 fathoms deep (360-480 feet) along this line and

Bellowing, snorting packs gather in the surf near their breeding beaches.

Steller sea lion families crowd the beaches of Bogoslof Island, a protected refuge, while hordes of nesting sea birds cling to ledges on the cliffs above them. (Victor B. Scheffer)

I have brought dead animals up on my hooks here. The big ones break the line and get away but the smaller ones that weigh only about 250 pounds are drowned. I am sure they get hooked on the bottom because they have been dead for quite a while when I pull them up and none were around when I was setting out my line. Besides we see them eating halibut at the surface when no one is fishing and the water is over 50 fathoms (300 feet) deep — and halibut are usually on the bottom. I am sure they never go deeper than 100 fathoms but I think they get that deep sometimes."

I spent several days on a sealing trip in Southeastern Alaska with Kitka and we often talked about sea lions. "Some of the fishermen who have shot sea lions that bothered them think the animals will attack a boat," he remarked once. "But I don't think a sea lion would attack a boat. If one is wounded he is afraid he will drown and then he will try to get out of the water and he tries to climb on the boat; then the fishermen think he is attacking them. If they are not wounded they are afraid of boats. Sometimes if they are very hungry and can see fish on a boat they will try to climb up and get a fish."

"Did you ever find rocks in a sea lion's stomach?" Kitka inquired. I replied in the affirmative and he asked if I knew why the rocks were there. To this I replied that I thought I did but couldn't say for certain. "My people have a story that tells the reason. The stones are there for protection," he volunteered. "You have seen sea lions shake their heads when they roar at you if you come on their breeding grounds, haven't you? Well, our story says that if the sea lion wants to he can throw the stones from his mouth when he shakes his head. He can throw them straight enough to hit a man. I have never seen this myself — but that is what the story says."

The rocks often found in a sea lion's stomach may be as large as a man's fist and there are often several of them. If the Tlingit legend were true, the sea lion would surely have a potent weapon of defense. Among fishermen a common belief is that seas lions pick up the stones for ballast while they are on the bottom, to enable them to stay down better when catching fish. Some naturalists, however, believe that, since the sea lion swallows its food in large chunks, the rocks aid digestion, acting much as grit in a chicken's gizzard, to break apart the large pieces of food. Another view is that the rocks are an aid in relieving the sea lion of

A young bull sea lion argues for resting space with a fur seal mother and her pup. Size wins — the sea lion got his nap out of bounds.

some of the numerous parasitic worms that often attach themselves in clusters to the walls of the stomach.

The experiences of fishermen with sea lions on their fishing grounds leave little doubt that the animals constitute an expensive and troublesome nuisance, and that where fishing equipment is destroyed, wisely supervised control measures are needed. Where the sea lions do not interfere with fishing activities, however, no evidence is available that their existence is in any way detrimental to the interests of mankind. On the contrary these majestic marine mammals are a fascinating and inspiring spectacle to reward those fortunate enough to visit them in their wild, rocky, and wave-beaten haunts.

After my late June visit to the sea lion colony on St. Paul, it was nearly mid-July before my other duties left me free to visit them again. I found the breeding picture astonishingly different. No longer were the bulls aggressively holding their harems and driving other males from their chosen territory. The cows, nursing their pups, were scattered at random along the rocky beach. A short distance from the noisy nursery area, as if in hopes of finding a little peace and quiet, a group of battle-scarred bulls lay sleeping. No longer did they consider every other male their enemy and when the sound of our presence awoke them, they gave us only a startled glance before plunging hastily into the surf. Now that the breeding period had passed their behavior had entirely changed. Not one of them bellowed or charged as before.

By late September, when I left the Pribilofs, the sea lions had deserted their breeding ground, but as our ship rounded an island, passing a rocky beach that lies at the foot of a mighty cliff, I noticed that the usual blackness of the broken shore had changed. It glowed a tawny yellow in the clear morning sun. Field glasses revealed that several hundred sea lions lay basking there in the cold fall sunlight. END

KEN STOTT, Jr

Aussie Ambassadors

TEDDY BEAR — who but the more ancient of us will not concede that *he* was the most inseparable companion of our early childhood? Information is not immediately available as to whether that article of plush over cotton batting, sawdust, or excelsior existed in its familiar form before the rise to fame of its acknowledged namesake, Theodore Roosevelt. But if you will look in the toy shops you will find a variety of ursine species generically termed "Teddy bears," and among them the favorite is not really a bear at all, but none other than *Phascolarctos cinereus* — the koala of southeastern Australia.

Regardless of size or material, the determination to species is certain. The koala embodies every feature of its nursery counterpart — a convenient armful of woolly body, short clinging limbs, and a melon-shaped head complete with fringed ears, patent leather nose, and shoe button eyes. And in addition, the magic of life has been breathed into it. Externally, it resembles no other living creatures, and its relationship to the kangaroos, opossums, and other pouch-bearing beasts is not in the least obvious.

The aura of universal affection which surrounds this little "Aussie" is unquestionably merited, yet in one respect it is surprising. Until the present year, no one outside of Australia has viewed the animal in the flesh for more than two decades because of a strictly enforced embargo on its export. In other words, except in its native heath, the koala's gentle appeal has been appreciated only vicariously through the media of toyshop facsimiles, books, and an occasional travelogue. A movie star, inactive and relatively unpublicized for a twenty-year period, would be all but forgotten, but not so with Teddy. Even without benefit of press agents, the koala's popularity has continued undiminished on an international scale, and its likeness has remained a household article throughout the Western world.

On January 7, 1952, an event took place which only served to fan the flames. A Pan-American clipper swooped out of the dawn to land at the Los Angeles airport, and its hold discharged one of the most precious animal cargoes ever to cross the Pacific Ocean — four living koalas! They were destined for the Zoological Gardens of San Diego and had been sent by the Australian government for use in Paramount's "Botany Bay," a motion picture which was to depict the colonization of the land down under. In essence, the koalas represented a goodwill gesture from the people of Australia to their friends in America.

This single exception in no way altered the status of the Australian embargo; koalas are still fully and rigidly protected. Twenty years ago, the species was dangerously close to extinction through disease, overhunting, and destruction of koala forests; and the Australians officially and unofficially are determined that it shall not happen again. The effectiveness of their conservation program has already removed the koala from the list of vanishing mammals, and its success thus far has encouraged Australian naturalists to double their efforts to insure a continued increase.

The arrival of the four koalas in San Diego was viewed with mixed emotions by members of the zoo staff. For the most part, they were elated to welcome such rare and literally priceless exhibits to the collection, but the responsibility involved seemed at first a little overwhelming. They were well aware of the criticism to which they might be subjected should this attempt at international transplantation end in failure. Australians feel a strong personal responsibility for their koala wards and would naturally take a more than casual interest in the only living specimens outside of their native land.

Every preparation for the koalas' arrival in San Diego had been made far in advance — actually, years in advance. Ever since the zoo's last pre-embargo specimen had died in 1929, officials of the institution had held stubbornly to the hope that some day, somehow, they might again be privileged to exhibit the species, and had forged ahead as if that slim chance were a sure bet.

The prime consideration in such preparations was the augmenting of already thriving stands of eucalyptus trees which covered the zoo's 200-acre tract, for the leaves and buds of these Australian trees constitute the only food eaten by wild koalas. Not just any eucalyptus trees would fill the bill, only those species which, according to naturalists' surveys, appealed to the finicky tastes of the koala. Of the hundreds of species of eucalyptus, there are only a few (roughly two dozen) that koalas accept.

Furthermore, it had been definitely established in Australia that koalas showed a marked preference for some trees of a given species, and not for others. Chemical analyses of the leaves disclosed a sound basis for such discrimination; the leaves of one tree might vary considerably from those of another because of varying soil content, water supply, and drainage about the bases of the trees in question. As a result, stands of each of the koala's favorite food trees were planted in the zoo in every available type of terrain and soil — in the dry, shallow hardpan of the mesa surfaces, on the grassy hillsides, and deep in the well irrigated arroyos.

It might appear that preparations made so far in advance were scarcely practical, since the possibility of obtaining koalas seemed slight. Yet proper fodder for these little marsupials could not be grown overnight. Despite the speed with which eucalypti grow, their leaves cannot be safely fed to koalas until the trees are at least five years old — ten, some authorities insist. The leaves from younger trees release hydrocyanic acid when chewed by the koalas, and this cumulative poison ultimately proves fatal.

The eventual acquisition of the koalas proved such long-term efforts entirely justified, regardless of how extravagant they may have seemed at the time. A long contemplated plan for care and feeding went into effect like clockwork the minute they entered the zoo grounds. To begin with, the koalas were put by twos in small protected cages where they, their dietary preferences and individual idiosyncracies, might be easily observed by our zoölogists.

Each cage had been equipped with sturdy eucalyptus trunks and branches with suitable crotches for the resting sites that koalas require — a vertical limb to which the animal may cling and a diagonal limb upon which he may lean his back. Watertight containers, fitted into brackets on the tree trunks, had been designed to hold and keep fresh enough eucalyptus boughs for a single feeding. Heavy tarps which might be rolled and unrolled like window shades had been placed on top of the cage so that the koalas might be shel-

Live Teddy bear, the koala. (Photos courtesy San Diego Zoo)

The koalas appear to feel at home in their temporary quarters in the San Diego Zoo.

tered from draughts during the night or inclement weather.

Since their arrival, the koalas have been given two daily feedings, one early in the morning and another late in the afternoon; being fairly nocturnal, they spend the warmer hours sleeping

soundly in the sun. The nutritional value of eucalyptus leaves is not high, so a koala must consume large amounts in order to survive. Furthermore, the animal rarely if ever drinks water; all of its fluids must come either from the moisture content of the leaves or indirectly from what is known as metabolic water, produced when the animal digests its food.

Each koala eats about two and a half pounds of leaves a day. The enormous quantity of cellulose which must be broken down may account in part for the vermiform appendix four to five feet long which is standard equipment for koalas.

Each feeding for the San Diego koalas includes at least three different kinds of eucalypti so that they may make their own selection – koala tastes, like human tastes, vary from one day to the next. If they are aware of any differences between Australian and Californian eucalypti, they fail to show it. Here as in Australia they find manna gum *(Eucalyptus viminalis)* akin to ambrosia, and they welcome supplementary sprigs of blue gum *(E. globulus)* and gray gum *(E. polyanthemos)*. Some species such as swamp gum *(E. cornuta)* are accepted enthusiastically at one meal and scorned the next. But the one they like best and the most regularly is a California produced hybrid between two species which koalas eat in the wild, *E. melliodora* × *E. rostrata*.

The only unnatural food given them is a formula comprised of four teaspoons of dextrose to one pint of milk. This potion, used in Australia to fortify koalas whenever they are transplanted from one area to another, provides them with additional food energy during the period of readjustment to a new environment. It was recommended by E. J. L. Hallstrom, president of the zoölogical society in Sydney. Mr. Hallstrom was instrumental in persuading his government to issue permits for koalas for California, and it was from his sanctuary that they were dispatched.

Eventually, the koalas will be released in a large enclosure containing full grown eucalypti, acacias, and other Australian flora. Their physical conditions should simulate those to which they were accustomed in the wild. Climatically, there is little difference between southern California and their native New South Wales, and here they will have access to the very foods upon which they fed formerly.

And if psychological factors are to have any bearing on the effectiveness of their conditioning, they should already feel at home. If they look carefully through the trees, they can see their fellow countrymen, the kangaroos and wallabies, basking in the sun, and in the distance they can hear the resonant booming of the emu and the raucous conversations of the cockatoo flocks. At night, they may scramble up and down their trees to the tune of the dasyure call, the whine of the dingo and screech of the brush-tailed phalanger. For all intents and purposes, they are still in their native habitat, yet they are available to thousands of their American friends to whom a trip to the real koala land can at present be little more than an idle dream. END

This koala was purchased on the open market in Victoria, British Columbia, in June 1952 by the editor's son, who subsequently presented it to his baby sister. Sibling, rather than international, good will was thereby fostered.

A POSTCRIPT on the koalas: On June 10 Sir Edward Hallstrom, President of the Zoological Park in Sydney, visited San Diego to deliver a communication from C. A. Kelly, Chief Secretary of New South Wales. By means of the letter, the koalas were permanently presented to the San Diego Zoo as a permanent gift. "In doing so," Mr. Kelly wrote, "I would like to express the hope that the presence of living koalas in the U.S.A. will serve to strengthen the bonds of friendship between our two countries, a friendship which was made very real by our servicemen who fought beside Americans in the Great War."

I thought that, in your revision of the koala story, you might want to make reference to the final disposition of the koalas involved. Naturally, we're overjoyed at the outcome.—*Letter from author to editor, San Diego, June 17, 1952.*

DONALD E. SAVAGE

Colombia is the Key TO A

PHOTOGRAPHS BY THE AUTHOR

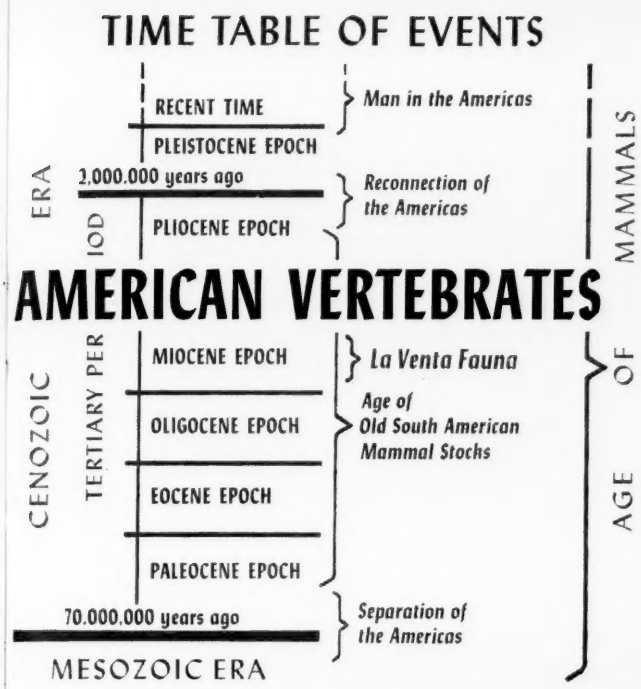
COLOMBIA IS A KEY AREA to the vertebrate paleontologist. For a long time he has hoped to uncover precise evidence in that country, evidence bearing on the dispersal and mixing of land mammal populations between North and South America.

All the paleontologists agree that at about the end of the Age of Reptiles, the Mesozoic Era, or at the beginning of the Age of Mammals, the Cenozoic Era, at a time perhaps seventy to ninety million years ago, certain groups of very primitive mammals had roamed southward out of the northern continent and were living as far south as Patagonia. These early mammals and their descendants we may call the *old South American stocks.*

Very soon after the animals had made their southward advance, South America became isolated. It was cut off from northern lands by one or more seaways and remained disconnected until nearly the end of the Tertiary Period. The Tertiary ended only one to two million years ago; so South America was a huge continental island for about seventy million years. Our old South American stocks, trapped in this vast asylum and not disturbed by immigrants from other continents, developed and diversified into many amazing types not found on other continents.

Eventually, the peaceful scene of this isolated continent with its peculiar mammal population was rudely and suddenly interrupted *(suddenly* means in the interval of a million years or so!). Stupendous mountain-making earth movements set the Western Hemisphere in a turmoil. The Cordilleran - Andean chains of high land masses were (once again) folded up and the Isthmus of Panama was established. Then, probably before the present day tropical rain forests developed, hordes of cats, dogs, field mice, mastodons, deer, tapirs, horses, llama-like camels, and other *North American offspring* pressed to the south over the new land bridge. This southward-moving phalanx was greeted by northward-venturing contemporaries from the old island continent: porcupines, armadillos, toxodonts, ground sloths, glyptodonts, and capybaras. The end of the Tertiary was truly a time of great faunal intermingling and diffusion. Colombia must have witnessed incomparably severe competition among animal populations during this interval.

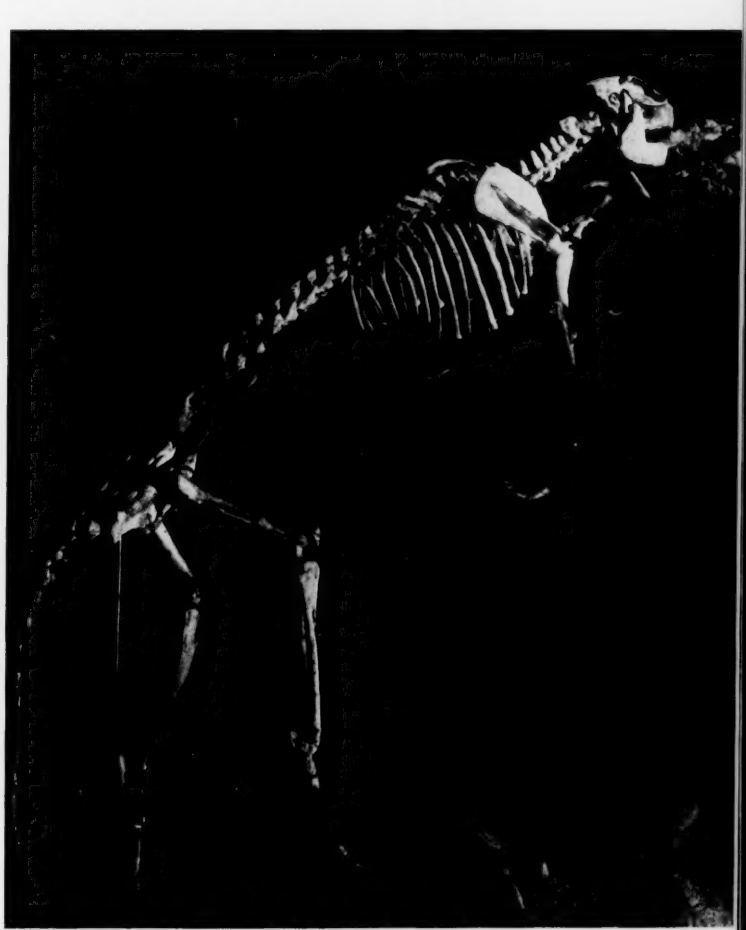
What better could the vertebrate paleontologist wish for than to locate fossil assemblages in this regional gateway? Here he could hope to discover faunas trapped in sediments at a time when mammals were first getting into South America — or



at a time when the pure South American stocks were in their heyday — or at the time when the North American invaders surged through. Such thoughts as these have spurred on the vertebrate paleontologists from the University of California at Berkeley. Dr. R. A. Stirton began investigations in 1944 and made his fourth field trip to Colombia in the early part of 1951. He and others interested in the paleontological work joined forces with zoölogists and botanists from California who were studying living animals and plants in the same region. For the two previous years, the field activities of the combined group of naturalists from California were sponsored and supported by the Associates in Tropical Bio-Geography of the State University. The Servicio Geológico Nacional de Colombia participated by furnishing geologists, field equipment, and field personnel and was generally most responsible for the success of the parties in the field. The writer was privileged to be the paleontological representative on the expedition of the summer of 1950. In 1944 and 1945, Stirton and Royo y Gómez uncovered many fossil vertebrate bones in the badlands of the Magdalena River valley of southwestern Colombia. Later expeditions (1949 and 1950) have returned to this same region and have made extensive collections.

These fossils come from sediments laid down during the latter part of the Miocene Epoch. To this most complete fossil mammal assemblage yet known from northern South America we have given the name, *La Venta fauna.*

The La Venta fauna represents one of the last of the mammal societies which was dominated by the old South American stocks. In this society, *notungulates* are second only to South American-type rodents in numbers of individuals. One of the notungulates, the interathere, looked something like a small and slender sheep with a long tail. Interatheres formed great herds which browsed and grazed over the countryside and were quite likely preyed upon by stealthy wolf-like and hyena-like marsupials. Legions of monkeys maintained arboreal retreat in the heavily forested areas close to streams and may have chattered down saucily at the giant twenty-five-foot caimans or the equally long gavial-like crocodiles. The *edentates* (ground sloths, armadillos, glyptodonts, and anteaters) were exceedingly numerous. Hundreds of huge tortoises ambled about probably minding their own business. Litopterns



Skeleton of the interathere — composite mount displayed at the Museum of Paleontology, University of California, Berkeley. Parts of several incomplete skeletons were duplicated in plaster.

formed smaller herds of camel-like and horse-like animals and no doubt preferred open country farther away from the main streams. Hippo-sized astrapotheres, some with upper and lower tusks as large as those of mastodons, frequented the stream borders and may have lost some of their clan to the crocodiles. Large bats performed their nocturnal capers and lungfish and catfish lived in their special retreats. The presence of a sirenian ("sea cow") attests to the existence of broad and sluggish streams. Lizards, snakes, frogs, snails, and arthropods abounded in their habitats. All this array of life is now well represented by the La Venta fauna.

Today this part of the Magdalena valley is a

↑ Modern pickup trucks do not swim the torrents of swollen quebradas very well. This time the Servicio truck didn't quite make it across Quebrada Las Lejas.

← The paleontologist's vista: a balky burro (south end), a hot tropical sky, and a hoped-for campsite somewhere in the badlands six miles ahead — but mostly just plodding burro, heading toward the Cordillera.

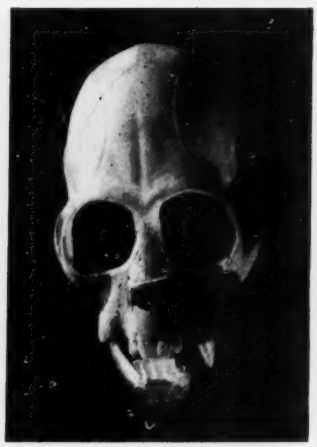
↓ Large fossil bones must be encased in a cast of plaster-impregnated burlap. Here Sr. Diego Henao, the Servicio geologist, and two assistants finish up a casting job on two bones of the giant ground sloth, *Megatherium*.

Prospects look slim in the Miocene badlands for Mr. S. G. Smith, botanist of the 1950 field party. But in contrast, down in the valley below where there was enough water for a plantation, we made a luncheon on sugar cane.

composite of desolate badlands and grass-covered mesas which grade abruptly into bush and forest terrain on the steep mountain slopes. The local citizenry clear away the dense cactus, thorn bush, and larger tree stands of the deeper and permanently-watered valleys and make room for their little plots of plantains, sugar cane, and yucca. But in late Miocene days there must have been greater rainfall, more streams, and more forest in the lower areas; and these lowland forests probably changed into chaparral and savannah country on nearby highlands. So, it seems that the upper Río Magdalena's grasslands and forests may have switched position since Miocene time.

But how have the expeditions fared as to other hoped-for discoveries? What about more evidence of the earliest mammal travelers into South America or more on the story of late Tertiary invaders via Panama? We have only partly succeeded. Stirton and his Colombian colleagues have found other mammal assemblages in the sediments of the Magdalena valley: one, at Chaparral, is late Eocene in age; another, at Coyaima, is late Oligocene. These collections, together with the La Venta fauna, begin to give us a clear picture of the evolutionary development and radiation of the *old South American stocks* in northern South America; but they do not represent the critical times of intercontinental dispersal. Pleistocene sands and gravels, usually exposed as river terrace deposits or as cappings on top of hills and mesas, have also yielded interesting vertebrate fossils to our prospecting efforts. In these younger beds we have found a strange combination of giant South American ground sloths *(Megatherium)* and South American glyptodonts associated with North American mastodons, deer, bears, and horses. Evidently our Pleistocene assemblage betokens a time *after* the northern invaders had infiltrated the native mammal societies.

And so our work goes on. Our collections now bracket the life assemblage which thrived and died (and perhaps became fossils) during that very interesting and very critical time of the meeting of the North and South. We have not yet found the earliest of mammals that trekked through this country, either. Our explorations are often fraught with difficulties and reversals. Reconnaissance in the outlying districts of Colombia continues to present frowning obstacles. These obstacles are all too familiar to those who have worked and explored in tropical mountain terrain. Gasoline must be shipped from "somewhere else" in the country. Abnormally heavy rainfall (which seems to fall each year!) invariably results in a breakdown of the railway and road transportation system. Gasoline-burning trucks do not run very well without gasoline, nor do they swim the torrent of swollen



Above: **Complete fossil skeleton of an interathere, prepared just as it was found in its rock matrix with the backbone unusually humped. Black areas restored; total length about two feet.** ***Below:*** **Plaster reconstruction of a monkey skull from the La Venta fauna.**

quebradas; hence, wide-ranging truck reconnoitering is often curtailed. Such was the fate of the 1950 field party. For one period of two weeks our truck was completely immobilized. Burros helped. They made possible the discovery and collection of several skulls and jaws that can only be described as beyond insurance rating for the vertebrate paleontologist. However, there are more delightful pastimes known to man than prodding and pushing a balky old jack over a score of rough, white-hot, badland miles at two degrees north latitude!

So we are busy as beavers now – preparing, cataloging, studying, illustrating, and writing about the many bizarre animals in the extinct faunas of Colombia. And we are still hoping to fill in the gaps in knowledge. Yes, Colombia is indeed a key area; but as yet the key has only halfway opened the lock. END

▲ Preparator R. W. Fields at work on the monkey skeleton. In the skull *(opposite page)*, the dark areas are actual fossil bone; light areas were based on the shapes of closely related living monkeys. The right-hand photo shows underside, without lower jaw. Both are actual size.

◄ The author puts the finishing touches on the lower jaw of a large astrapothere from the La Venta fauna, collected in 1950. (Photograph by Mr. S. I. Strashun)

africa south

BORYS MALKIN

THE PORTUGUESE LINER *Imperio* sailed from Luanda, Angola, on October 12, 1949, at 6 P.M., and made two stops en route to Cape Town, both in the Portuguese West African territory. The first, Lobito, a major West African seaport, thrives as terminus for the railroad to Elizabethville in the Belgian Congo and as outlet for the copper, uranium, and other ores of the fabulous Katanga basin. We landed quite early in the morning and I was soon on the beach collecting seaweeds, the marine mites living in them, and small beach-loving tiger beetles. The road I followed inland passed through salt pans and large mounds of salt which contrasted like snow with the black laborers. The Negroes, mostly women and children, marched up the mounds, baskets full of salt on their heads, emptied their loads and then, singing, filed down again.

The hills around Lobito and along the entire Angolan coast from Luanda south are of chalk and limestone. Vegetation is sparse – short grass and xerophytic bushes – and only under stones did I find good collecting. Many of the insects were flightless as is often the case in the desert. Dry though the country was, I was increasingly fascinated by new and curious forms of life, until an inner voice warned me I should start back. My watch said 3, the ship would not sail till 6 – but things didn't look right. After I had walked hard for an hour, and the town still far away, a car stopped – it was 5:30! The jalopy stalled on the outskirts. I ran. One gangplank was up – and up went the second as I hit the deck.

Mossâmedes is less impressive from the sea than Lobito. Instead of hills the small town rests against a virtual sea of white sands fringed by narrow eucalyptus groves supposedly stopping the onslaught of the dunes. Rainfall is less than 3 inches a year. Lightering in from the open roadstead, I had two hours beach collecting before we sailed. Soon after, we cleared the Angolan coast.

The seas were brilliant from the fine weather. The shores we stood off were frequently enmeshed in fog, for it is a misty coast, this of the Namib Desert stretching from Angola to Namaqualand of South West Africa where it borders the Union. Rainless, almost entirely without vegetation, with moving dunes, the Namib is shrouded in fog a good part of the time. It is one of the few genuinely cold deserts in the tropics (the other important one lies along the coast of Peru and northern Chile), and results from the cold Benguela Current. Whoever named Cape Frio, a bend in the Namib coast, felt this Antarctic influence.

The night before we stood into Table Bay a violent storm shook the ship which danced and fought the wind and waves. We made Cape Town several hours behind schedule, the morning of October 15. Customs and immigration officials gave me no trouble, only requiring assurance that I was not a newspaper man. The Union's racial policies do not inspire friendly commentary abroad.

My six weeks in the Union of South Africa I enjoyed immensely, perhaps more than any other part of the trip. Getting to the fine collecting sites was no problem with excellent communications. Inexpensive hotels everywhere eliminated difficulties with provisions and camping. The climate suited me well – Cape Province corresponds more or less to the maritime regions of southern California except that it is not quite as warm. October and November give South Africa's advanced spring, when flowers and insects are at their best. I made Cape Town my chief headquarters coming in and out, sometimes for two weeks at a time, until my final departure. For the ease of my work and the pleasure of my stay I owed much to members of

Salt, not snow — basket-laden Africans heap up the product of the salt pans at Lobito on Angola's shore. (Malkin)

the staff of the South African Museum in the city, especially to Dr. R. Hesse, the entomologist, and Dr. K. H. Barnard, the director, who helped with much useful advice about collecting sites and transportation. And Dr. Andrea, a beetle expert living in Cape Town, also had a hand in guiding me to the insects.

My first few excursions were in the near vicinity. To Muizenberg I went with Dr. Andrea and Dr. Carl Koch of the Transvaal Museum who came a few days after my landing. This was no more spectacular than a similar walk in the environs of Berkeley, California, but here on the other side of the world it had an exotic flavor. *Peripatus,* for instance. Here I met that zoölogical enigma for the first time. Taxonomists haven't yet made up their minds which of two major divisions of the animal kingdom he belongs to — the arthropods or the segmented worms. Looking somewhat like a cross between a caterpillar and a slug, *Peripatus* meanwhile lives his retiring life under logs and rocks in wet tropical woodlands of many parts of the world, nor is he the least concerned that systematists have tentatively shelved him in a phylum of his own. When we dislodged him and his family, they all merely tried to get away as fast as their short if numerous legs would take them. Our own course led out of the suburban woods and down to an excellent beach where shifting dunes are slowed down by the native *Eragrostis* grass. We spent considerable time digging in the sand, and Koch and Andrea returned happy from the trip with a few new species of beetles.

To Paarl and Du Toits Kloof I went alone. Nowadays a very comfortable modern train takes one the 30 miles from Cape Town to Paarl in little over an hour. But in former times it must have been a wild country. Andrew Sparrman, one of the first and foremost botanical explorers of this region, took six days to cover the same distance in 1772. The train runs parallel to the old mountain range which rises to nearly 6,000 feet and is, in October, usually topped with snow — a remarkable sight to me after so much time in the tropics. Collecting in the immediate vicinity of Paarl although quite good was less promising than a visit to Du Toits Kloof, a pass through which a road was cut but a few years ago, with native vegetation still intact. A kindly motorist took me the ten miles on to the crest of the pass, which is about 2,500 feet with the mountains above it nearly 5,000. A lovelier sight I have rarely seen. Here a large river has cut through the mountains, forming a very deep canyon of purplish, red, pink, and yellow hues. As I entered the meadows on both sides of the stream I walked waist deep in a sort of heath with deep-pink flowers. In wet places large white-and-yellow callas stood upthrust like gaping fish mouths, at the bottoms of which I always found trapped insects. Magnificent silver trees were scattered throughout the valley, golden yel-

Cape Town, chief seaport of the Union of South Africa, lies at the foot of Table Mountain. (Photograph courtesy South African Government Information Office, New York)

Collecting was good in beautiful Du Toits Kloof. (Malkin)

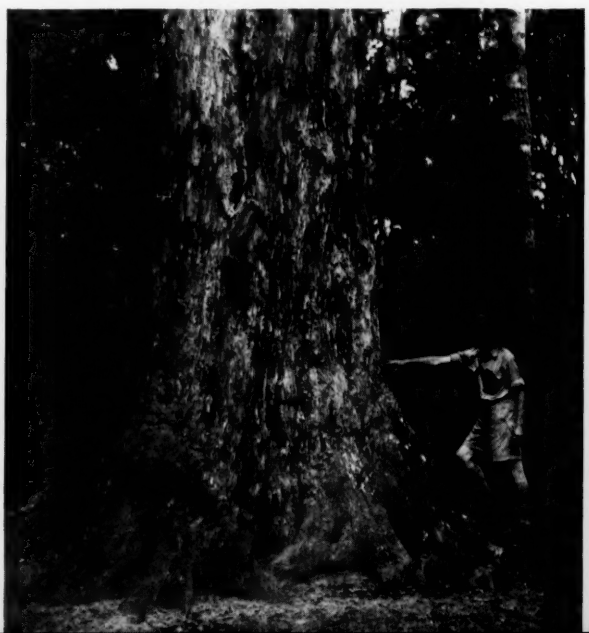
Dr. Andrea, left, and author at Blinkwater Falls. (Carl Koch)

low flowers covering them completely. This was a most enjoyable experience. Besides, on this and two later trips up Du Toits Kloof, one day each, I got a total catch of nearly 10,000 specimens – over 700 species – of insects and spiders. In the families represented, it was more like southern Europe and California than equatorial Africa.

Table Mountain was another trip. Taking a bus from the large modern city of Cape Town at its base, we were soon afoot on the trail leading to Blinkwater Falls about half way up the steep side of the 3550-foot plateau. Here too there was a multitude of flowers, but little more than remnants of the once dense and widespread native forest, now reduced to the steep canyon running up the mountainside. Even this last stand was being threatened by foreign invaders, Monterey pines and eucalypti. Not only plants, but insects also, have suffered from interlopers. All the ants I took on the slopes of Table Mountain were Argentines, *Iridomyrmex humilis;* native species I found only at considerable distance from Cape Town. Tiny, brown, insignificant, *Iridomyrmex* were numerous in every crevice and under every stone, completely replacing all native forms. Because of its superior social organization and great adaptability to various climates, the Argentine can displace any other ant species.

In less than an hour we climbed up past several rock overhangs that might once have sheltered aboriginal men, and reached the Blinkwater Falls. A stream running down the precipitous mountain slope, almost flat, formed high falls which ended in a pool no more than waist-deep and a few yards across. To me this pool was the main attraction, its bottom strewn with boulders and rocks which I turned up. Tiny beetles, mostly under 3 mm. long, clung to their undersides. Among hundreds of beetles were three aquatic families. Later I sent them to Mr. Balfour-Browne of the British Museum who found the entire lot made up of new species, a dozen of them, with two new genera. The most interesting occurrence was of a genus formerly known only by a unique species from Chile – our African lot added two undescribed species. Speculation about these closely related species, comprising a genus so far known from no other parts of the world but the southern tips of South America and Africa, might give encouragement to enthusiasts for the Continental Drift theory.

Shortly after this excursion I took off for the eastern Cape Province to see the famed Knysna Forest and Cango Caves. A new and excellent train took me in 24 hours to Oudtshoorn, more than 350 miles east of Cape Town. It was October 25. Next day the skies



The giant yellowwood, largest tree in the vast Knysna Forest which flanks the jagged mountainous escarpment of the Little Karroo. (Photographs courtesy South African Railways, Durban)

opened up with a downpour on the desiccated country. The sorely needed rain came all day, first in many months. Oudtshoorn is in the Little Karroo, a semi-desert region much resembling the drier parts of Arizona except that the sagebrush and cacti are replaced by innumerable species of dwarfish euphorbias and mesembryanthemums. There are the same reddish and pink soils, the same mesas and eroded plateaus on the horizon. The country is fertile; with irrigation it could support fair crops. As it is, sheep are the chief wealth here, but now they were dying by the thousands in the Karroo and in Transvaal farther north – 1949 brought one of the worst droughts in many years.

On this long awaited rainy day I went over to see the Cango Caves. First I paid a visit to the offices of the municipality of Oudtshoorn, which runs the Caves as a national monument. The officials were extraordinarily helpful. Not only was I allowed to go into the Caves free as many times as I wanted, but also a guide was provided without charge to take me around, and I was permitted to set up insect traps.

From Oudtshoorn to the Caves I went by bus over a road through deep canyons up to the base of the Montagu Pass in the Zwartberg Mountains. The country was still rocky and barren with vegetation mostly along the streams. It was cloudy with intermittent rain. By early afternoon we reached the caves and I found that the superintendent had already been notified by phone of my arrival.

Though neither as extensive nor as resplendent as Virginia's Luray Caverns, the Cango Caves are quite impressive and a fine example of the action of underground water. Electric lighting reveals the soft limestone formations and fantastic stalactites produced from them by leaching. The first chamber is over 200 feet long and almost 70 high. Close to the surface it harbors untold thousands of bats suspended from the ceiling or hiding in cracks in the walls. How long these fellows have lived here is not known, but their guano carpets the floor to nearly 4 inches even where packed down by human feet. In it I found thousands of minute ptiliid beetles, less than 1 mm. long, which showed every sign of adaptation to cave life. Unlike their surface-living relatives of the same type they were both wingless and totally blind. My joy at this find was later confirmed – according to my friend Hank Dybas, a curator of insects in the Chicago Natural History Museum, this was an entirely new genus not seen before. Besides these ptiliids I found a curious new ground beetle, pale yellow, of the group which is usually found in the caves of Dalmatia and Spain, although this one was not blind.

My traps I left in selected spots, usually in the dark, buried to the ground level – a half dozen cans with chunks of fresh meat or cheese in them. The odor attracts insects, which crawl over the edge, fall in, and can't climb out. As we went on to explore the caves farther, I noted the warm air with no draft, temperature constant, probably about that of the usual heated American home. I had started into the caves with a heavy GI jacket and sweater on, but ended up in a T-shirt.

When I returned to the Cango Caves a week later, the superintendent and the guide met me at the entrance with a chorus of "Mr. Malkin! Are we glad to see you! I hope you'll remove your traps – they stink all over the place!" I assured them I would. The instant I entered the first chamber my nose confirmed the sordid truth. Even though buried at the far end the bait traps proclaimed their presence by a most foul odor. I exhumed them, but their catch was disappointingly small. I fared better turning up wooden planks and concrete once used for steps.

The next day in and around Oudtshoorn I had brisk, lovely weather, good collecting, and my introduction to the ostrich. Apparently ostrich feathers are still in vogue, enough to keep a number of South African ostrich farms in business, which in turn prevent extermination of the bird. When the tail feathers are at their best the ostriches are lassoed, the feathers pulled out, and the birds left to grow new ones, a process that can be repeated several years in succes-

sion. The industry suffered a sharp decline, however, after World War I. Near Oudtshoorn, its center, I came upon a high-fenced corral. Several of the huge birds were close to the fence, and one particularly large female came right over as soon as she noticed me, hissed nastily, then hung over the fence trying to strike me with her beak. I backed out of range. The furious lady kept a suspicious watch and when I closed in again she repeated her performance. We kept this flirtation going for almost half an hour until I gave up, convinced that she was congenitally ill-tempered.

By train I went on to Knysna, a small, pleasant town to seaward of that upland plateau, the Little Karroo. The tracks crossed several rivers and followed their course along the edges of deep canyons. In one place a high bridge crossed an estuary. Finally we ran for some distance to Knysna right along the Indian Ocean shore and I could clearly see the coastal formations.

After a day along the coast, thanks to a local M.D., I hitchhiked up to the Knysna Forest, near the top of the Zwartberg. What a contrast to all those dry, barren lands I had seen during the past few months! It is more like a temperate forest in appearance, although entirely lacking in the true conifers — there are few native to Africa south of the Atlas Mountains. The trees were not too large, but dense, with much brush and undergrowth, fallen logs, and large tree ferns. One might have thought himself in New Zealand, southern Australia, or perhaps the coastal forest of the Pacific Northwest or even southeastern Alaska. But if the trees and insects did not tell the visitor he was in none of those regions, the large impressions in the ground and huge piles of manure did. Elephants! The last remaining herd of the Cape elephant still survives in this forest, under careful surveillance. The smaller size of this animal may indicate a race distinct from the elephant found farther north in more open country. I hoped to see some of them (though not quite sure what I would do if they were coming towards me) but all I found was their spoor and that quite old. This elephant is an exceedingly shy fellow, I learned, and seldom seen in the daytime.

The elephant was not the only large animal associated with the forest. The buffalo was here once, but it had disappeared completely before 1900, accounts say. Karl Peter Thunberg, a celebrated pupil of Linnaeus, traveled through near-by regions towards the end of the 18th century and in his diaries told how he and his companions were driven up trees by a buffalo that charged without provocation. But I had nothing of this sort to fear. With the buffalo extirpated and elephant reduced to this one herd, the large game, once so incredibly numerous in the Cape Province, is gone. The Cape mountain zebra was seen not very far from Oudtshoorn as late as 1900, but the quagga had been totally exterminated by the middle of the last century. Now one must go to the Kruger National Park, other parts of the Transvaal, or to the Orange Free State to see large game in considerable numbers in South Africa.

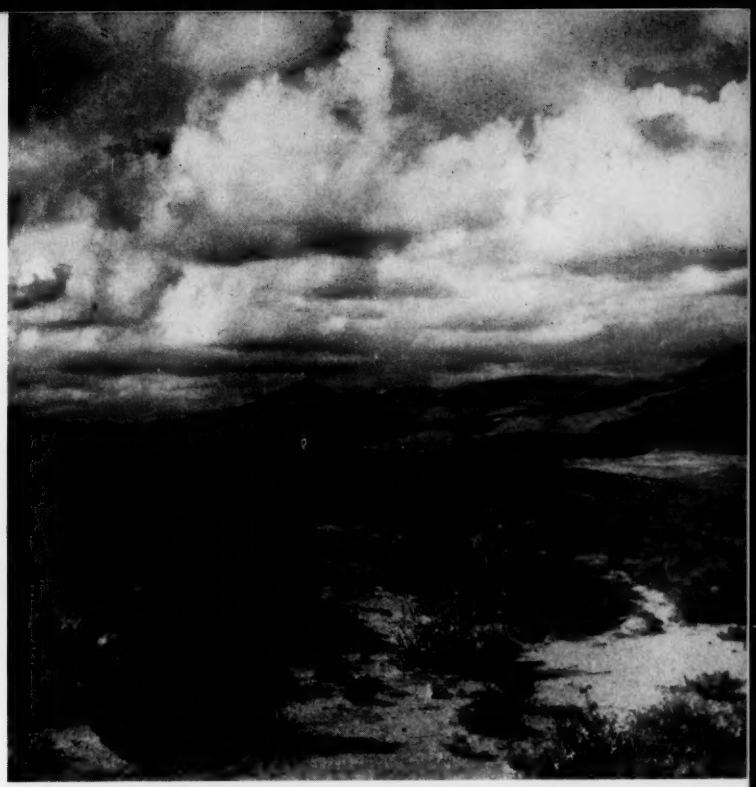
The Cango Caves near Oudtshoorn display a fantasy of huge limestone stalactites. (Photograph courtesy South African Government Information Office, New York)

My two trips to Knysna Forest paid handsomely. Though walking was hard, it was easy to find insects. Worth mentioning is the largest tree in the forest, a yellowwood *(Podocarpus),* 137 feet high, 21 feet in girth, its age estimated at over 1,500 years. Several trees were marked by symbols, their names given on small tablets along the paths. Mosses and lichens were dense, many mosses hanging down in festoons to compete with the creepers. After working this place over I returned to Cape Town November 5.

A week later Carl Koch and I set out for Namaqualand in his panel truck, reaching Clanwilliam on the first day. It was all Karroo country, with hills and scrub, much like that around Oudtshoorn, but more settlement and irrigation. There were extensive wheatfields, and eucalypti around the villages, reminding me of the drier parts of northern Queensland. The population was much mixed – English and Boer, the latter among themselves speaking Afrikaans almost exclusively, and showing Hottentot influence in some of their faces.

We camped overnight a few miles north of the town. Before we went to sleep we spent several hours talking in the dark over a large collecting canvas on which we placed our Coleman lantern. All sorts of creatures came that evening in spite of considerable cold – it had been a very hot day – and while Carl concentrated on the moths I looked for the remarkable neuroptera, Nemapteridae, which came to the light. These insects have normally developed fore wings but their hind wings are transformed into long feather-like tails, at least three times the length of the fore wing and probably entirely nonfunctional for flight. They were coming in pairs, one first and the other immediately following, perhaps males after females. The next pair would come after a pause. Twenty-one individuals landed that night, including one lone wolf – Dr. Hesse told me later that we'd had rare luck. In over 60 years collecting the entire lot of them in South African Museum numbered about 25. Carl and I struck one of those infrequent occurrences that might not come again for many years.

For the better part of a week Carl and I roamed the arid northwest of the Cape Province, from Strandfontein and the cold misty beaches at the mouth of the Olifants River north to Bitterfontein and Garies within the exceedingly dry southern limits of Namaqualand. In heavy sweaters we collected in the astonishingly plentiful insect fauna under mesembryanthum, the interesting solpugids, beetles–among them a new species of the tenebrionid genus *Cychrantia*–and other insects of the inland desert while waiting periodically for our motor to cool off. Skeptical at first, I soon learned from Carl how deep into the sand insects go to escape the intense ground-surface heat – they prowl for food at night – and discovered that little is to be

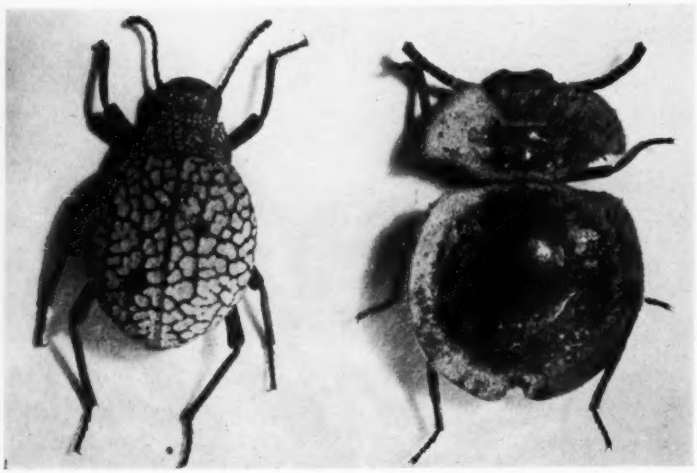


↑ The rolling arid country near Garies is much like our own Southwest and Great Basin landscape. (Malkin)

← Hottentots have the epicanthic fold over the eye that is an ethnic mark of certain Oriental peoples, along with definite Negroid characteristics. (Malkin)

Dr. Carl Koch digs in sand dunes at Klaver for a new species of tenebrionid beetle which was named for the author, *Cychrantia malkini.* (Malkin)

found in dunes of very coarse sand. We surmised that the insects could not so easily dig in the heavy stuff. Again I noticed the similarity of the country to Arizona desert land. Much of it is reddish; and many of the euphorbias look amazingly like cacti, but have no thorns. Another example of similarity has been provided, on the beach, in large numbers of *Carpobrotus,* a creeping plant with beautiful large yellow or pink flowers, growing close to the shore. A few weeks after my return from Africa I was walking on the beach in



Desert-adapted tenebrionid beetles from Angola, enlarged. (C.A.S. photo by Edward S. Ross)

San Francisco – there, to my surprise, was *Carpobrotus,* in full bloom and in the identical habitat. This is none other than our familiar "ice plant" and is generally classified with the mesembryanthemums.

In Garies, a small and very dry mining town, Carl and I parted. His companionship had been most congenial, and since my return home I have enjoyed a frequent exchange of letters with him. To Carl I owed this most interesting and successful part of my tour in South Africa. Now he had objectives farther north, and it was time for me to head back for Cape Town, which I did by train.

A few days later I made another trip to Blinkwater Falls and, the next day, I rode the aerial cable car to the top of Table Mountain. This took just eight minutes from base to summit.* The day was lovely but wintry and I did very little collecting. While I bent over turning stones, a gentleman in a beret accosted me in a strong French accent: "Pardon me if I am intruding, but I am also a naturalist and would like to know what you are doing," whereupon he introduced himself. He was Dr. Millot, director of the Institute Scientifique in Tananarive, Madagascar. Having come from a scientific conference in Johannesburg, he was stopping in Cape Town for a few days to await a plane for Elizabethville and then to Paris. I knew of him as one of the foremost experts on spiders, and we had some pleasant times together.

Whatever Table Mountain's true altitude, the view from it is truly magnificent. The mountain as seen from Table Bay is merely one edge of a high plateau thrust westward from the continent to fall abruptly seaward to the city at its foot. Looking northeast, I saw canyon-cut, red-brown, gigantic table land, much like our own Southwest; looking down the sudden drop to the spreading ant-hill city far below, I could see in the port the great liner *Athlone Castle* on which I was to sail day after next, the size of a very small toy. At 5 P.M. I went down, shivering from the wind.

That next day was occupied with shipping off footlockers of specimens to the California Academy of Sciences, with my own packing, and with goodbyes. Then came November 24. The *Athlone Castle* sailed at four in the afternoon.

The voyage to England was uneventful but very pleasant, with fine weather except for the depressing Harmattan haze in the Gulf of Guinea. We passed Conakry and the estuary of the Senegal River, then on November 5 sailed into Las Palmas in the Canary Islands. Though it was just dawn, the peddlers of local wares swarmed upon us along the great concrete pier. I took a taxi and went sightseeing. Needless to say this included some collecting, and by great good luck I found and managed to get back alive to San Francisco some of the Embioptera, or silk web spinners, with which Dr. Edward S. Ross, Academy curator of entomology, is experimenting in the course of his world study of this little-known order of insects.

For several hours that afternoon we sailed through perfectly glassy waters, until the bleak, dark shores of the Grand Canaria and the dark 12,000-foot Peak of Tenerife cut through the red of the evening sky. Two days later we saw the villages and lighthouses of Cape Finisterre, and on the morning of November 9 sailed into Southampton. My friend Roderick Sweeney of Croydon (now doing entomological work in Anglo-Egyptian Sudan) met me at Waterloo Station in London. My African trip was over.

Four weeks later I was homeward bound on the *America,* and in New York on January 13, 1950, almost two and a half years after I had sailed for England with the idea of getting to Africa, somehow. In San Francisco at last, I found my collections all in except for what I had shipped from Cape Town which arrived several months later, and some stuff I'd left in Douala, French Cameroons, which took almost another year. END

*"The highest point is variously stated at 3549, 3582 and 3850 feet" *(Encyclopaedia Britannica,* 11th ed.); "3550 ft." *(Webster's Geographical Dictionary,* 1949).

REVIEWS

Food and flight

AMERICAN WILDLIFE AND PLANTS: *A Guide to Wildlife Food Habits.* By Alexander C. Martin, Herbert S. Zim, and Arnold L. Nelson. The McGraw-Hill Book Company, Inc., New York, 1951. ix + 500 pp., illustrated. $7.50.

Up to now the literature on food habits of wild birds and mammals has been scattered widely in technical journals, pamphlets and books. The present volume marks the first attempt to compile a general guide to the food habits of North American wildlife. As the title implies, the focus is on utilization of plants and plant products for food. Part I of the text deals with the relative importance to wildlife of the main plant groups, palatability and nutritional value of specific plant foods, and methods used in food habits studies. Part II includes an abbreviated summary of food habits of most species of birds and mammals in this continent. Part III considers important genera of plant foods and their utilization by wild birds and mammals. For each animal and plant listed, range maps, identification sketches and a short paragraph of text are supplied. Thus one can find in Part II a list of the main plant foods of any given species, such as the mallard, for example. A principal mallard food over much of North America proves to be Pondweed, of the genus *Potamogeton.* Under Pondweed, in Part II, are listed the mallard and several dozen competitors that also eat the same plant. In this manner information is cross-filed so as to be easily found under either the name of the plant or of the animal that eats it. The condensation and abbreviation of voluminous data into such simplified form leads naturally to omission of much detail. But for the purposes of the average reader detail is unnecessary. As a general, quick reference on wildlife foods this volume will be of inestimable value to professional and amateur naturalist alike.

MIGRATION OF BIRDS. By Frederick C. Lincoln. Doubleday and Company, Inc., Garden City, New York, 1952. 102 pp., 23 figs. (maps). $1.00.

Frederick Lincoln, a senior staff member of the U. S. Fish and Wildlife Service, has devoted his life to the study of bird migration. He was a pioneer in systematizing bird banding in North America and in assembling and interpreting the voluminous data on band returns. *Migration of Birds* is an attractive little volume, presenting in popular language the highlights of our present knowledge of the subject. The author is careful to distinguish between what we *know* about the seasonal movement of birds from summer to winter ranges and what we *surmise* about the origin of migratory habit, the navigational senses of birds and the unsolved aspects of migration. Handsome, illustrated maps by Bob Hines enhance the presentation.

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Zoologists' workbooks

AN ANALYSIS OF THE DISTRIBUTION OF THE BIRDS OF CALIFORNIA. By Alden H. Miller. University of California Publications in Zoölogy, vol. 50, no. 6, 1951, pp. 531-644, pls. 32-40, 5 figs. in text. $1.50.

The author has attempted in this work to draw some generalizations pertaining to the distribution of avian species in California. This has been achieved by considering the relationship of species distribution to life-zones, ecologic formations, and biotic provinces and with full knowledge, to quote the author, that the "Distributional patterns of birds may not be expected to conform to any simple system of major groupings, since the spatial balance of each species is a situation peculiar to that species."

The taxonomists will be impressed by the fact that, in California, species exhibiting the greatest amount of racial differentiation are those that generally have broad zonal and ecologic ranges. Ecologists will welcome the data presented by Dr. Miller to support the conclusion that the Canadian, Hudsonian, and Arctic-Alpine zones should be considered as subzones of the Boreal Zone.

Anyone with more than an amateur interest in western ornithology will find this publication of considerable value.

A TAXONOMIC AND EVOLUTIONARY STUDY OF THE PINON MOUSE, *PEROMYSCUS TRUEI.* By Donald F. Hoffmeister. Illinois Biological Monographs, vol. 21, no. 4. Universiity of Illinois Press, Urbana. 1951. ix + 104 pp., 24 figs., 5 pls. Paper, $2.50; cloth, $3.50.

This work will be a bit on the technical side for all but the professional mammalogist. However, it is concerned with geographical variation in and evolutionary development of a fairly restricted species of mouse belonging to a genus that is widespread in North America. Detailed studies of this sort, relating to genetic variations in different populations within a single species, are of utmost importance to students attempting to analyze evolutionary processes. In fact it is largely on the basis of such taxonomic studies that many of our present general concepts regarding speciation have been formulated.

AMERICAN WEASELS. By E. Raymond Hall. University of Kansas Publications, Museum of Natural History, vol. 4, 1951, pp. 1-336, pls. 1-41, 31 figs. in text.

This book represents the culmination of a study that has extended over a period of twenty-six years. During that time the author has had an opportunity not only of studying these diminutive carnivores extensively in the field but of examining over five thousand specimens of weasels in the major museums of the world and in many private collections. The result is a comprehensive monograph on the

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The complete story of the California Academy of Sciences African Expedition by Borys Malkin, as told in *Pacific Discovery*:

1. Trails Out of Tripoli. Nov.-Dec. 1948, pp. 22-27.
2. Saharan Contrasts. Jan.-Feb. 1949, pp. 18-25.
3. Nigerian Odyssey. Jul.-Aug. 1949, pp. 23-31.
4. Clouds Over Cameroon. Nov.-Dec. 1949, pp. 20-28.
5. Passage to São Tomé. Sep.-Oct. 1950, pp. 18-22.
6. Angola Report. Sep.-Oct. 1951, pp. 19-25.
7. Africa South. Jul.-Aug. 1952. pp. 24-30.

See also: Doryline Dragnet—Army Ants in the Cameroons. By Borys Malkin. Jan.-Feb. 1950, pp. 28-29.

Map of Malkin's route: inside front cover, this issue.

taxonomy and natural history of members of the subgenus *Mustela* in the New World.

In this hemisphere weasels range from Arctic North America south to Lake Titicaca in the Andes of South America, a distance of nearly seven thousand miles. Over this vast area there are four recognizable species of weasels, two of which also occur in the Old World. The greatest amount of geographic variation is exhibited by the long-tailed weasel *(Mustela frenata)* which has forty-two recognizable subspecies. This species is restricted to the Americas. The tropical weasel *(Mustela africana)* is limited to northern South America and breaks up into two recognizable races. Of the two Holarctic species the ermine *(Mustela ermina)* shows the greater amount of racial variation in the New World where there are twenty currently recognized subspecies while the least weasel *(Mustela rixosa)* has only four subspecies throughout the portion of its range in North America.

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Keystone science

UNDERSTANDING HEREDITY: *An Introduction to Genetics.* By Richard B. Goldschmidt. John Wiley and Sons, New York and London. 1952. ix + 228 pp., 49 figs. $3.75.

This book of only 237 pages, including preface, glossary and index, is an adequate introduction to the broad field of genetics for both scientist and layman. It includes the essential basic principles; at the same time it reveals the all-sided relationships of genetics which has been called by another author the "keystone of the biological arch." The subject matter is carefully selected; the facts and illustrations, many of them from human data, are dependable; the style is simple and clear. In short, it is easy and interesting reading for anyone desiring an introduction to this all important phase of modern biology.

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(Continued from page 3)

reluctantly we left this city of lovely homes and gardens after buying — come Thursday morning — a keepsake or two, such as the very personable Teddy bear our son selected for his baby sister (see page 17).

The Black Ball Line's *Chinook* is the streamlined ultimate in ferry boats; Juan de Fuca Strait gave us no more than a gentle roll; the storm in fact had lifted, but high enough only to tantalize us with the bared lower limbs of the Olympics as we crossed to Port Angeles. Here we disembarked, car and all, via nothing less than a dockside elevator —and put Port Angeles down as a young city on the way up. At Olympic National Park headquarters we saw the mountains at last — in miniature — and that was indeed the last we saw of them. The Olympic Peninsula was to be, in our minds, the peak of the trip. . . . .

By the laws of nature we could hardly have expected the grandeur of the Olympic mountains *not* to remain beclouded, but what man has done is hard to forgive. From Port Angeles west and then south over U. S. 101 there is scarcely a mile, except along Lake Crescent just within the Park boundary, where the scenic values have not been partly or wholly destroyed by logging. Where was the illimitable rain forest of cedar, spruce, and Douglas-fir, greatest thing of its kind on earth? All we saw was overcrowded second growth, blasted stump land, and burns. A one-track side road only the Devil himself could have devised took us 16 miles up the Hoh River to a point within the Park boundary — we'd ben told this was the best chance to see rain forest. The Hoh valley was very lovely, in spite of much logging, and we did see more unspoiled forest beside the road as we got near and into the Park. But the 15-mph average ate up our time and we had to turn back three miles short of road's end. Perhaps we thus missed the best remnant of rain forest on the entire peninsula — we don't know. We were glad to have seen a small sample, at least, and resolved to come back some day with time for exploring. There are other roads.

From Aberdeen to the Astoria ferry we saw much beautiful country near the coast — forested hills, lush meadows, salt marshes, lagoons, and sand spits. The famed Oregon Coast has lost a lot of its wildness to Manhattan Beach-type resorts, but state parks have saved a good deal in between. We turned inland at Newport for Corvallis, where we left the last of our *PD* stock. Then Eugene, Grants Pass, Crescent City, the Redwood Highway — and home. As we came out the Smith River gorge and into the first of California's magnificent Redwood State Parks and commemorative groves, we said to each other: "If only Washington had had a 'Save-the-Rainforest League' the northern end of U. S. 101 would have equaled the grandeur of this." If we may include in "Northwest" that part of California which runs north from Cape Mendocino and Mt. Shasta, the region ended gloriously for us with rhododendrons blooming among the Sequoias.

THE NORTHWEST comes home with us, and stays, in strong impressions. Everything is positive, much is superlative. Snow is nowhere whiter, grass and trees nowhere greener, people nowhere friendlier. Northwest forests are the biggest; where cut, they are the most utterly destroyed; where restored, they boast the hugest of all tree planting programs. Northwest rain is the wettest, and oftenest; Northwest sunshine, conversely, is the most appreciated. Northwesterners have big plans, high hopes, and open hearts, attributes that go with a big land. Perhaps the Indian was right: the gods are in those mountains. D.G.K.

? QUESTION MARK

WE ANNOUNCED THIS PAGE in the last issue of *Pacific Discovery* with a teaser – a quarter-page ad consisting of a large question mark, with the legend, "Watch *PD*." We intend it (the page, not the ad!) as a recurrent – perhaps a regular – feature of the magazine. We are not sure that we shall cling to the above as a permanent heading, and we welcome suggestions.

A science museum is in constant receipt of inquiries on every conceivable scientific subject – and on some unscientific subjects as well. Not infrequently the earnest inquirer frankly admits that he is trying to settle a bet! Through the diversified knowledge of about a score of specialists who make up the Academy's technical staff, we are able to answer most of these questions, or else – as sometimes occurs – to definitely assure the inquirer that the answer is unknown to science.

Since many of these questions and answers are of considerable interest, we have decided to share them with our readers. In this first installment, for which we are picking questions and answers out of our regular mail, we are concealing the name and address of the inquirer, because a person who writes a simple letter of inquiry and receives a reply might conceivably regard it as an invasion of his privacy to find this correspondence turning up in print with him as a principal. In future, however, we propose to give names and addresses unless a request is made to the contrary. Persons who wish to preserve their anonymity may do so by stating their wishes in submitting their inquiry.

We do not promise to publish all inquiries submitted. This is not because we are afraid we don't know the answer (although this year we had one that we had to think over for six months, and we still don't feel satisfied with our reply). Our selection of questions and answers will be based on what we consider to be the interest of the informed general reader. With this preamble, we are off!

It is important to me to find out how long a seal can hold its breath while swimming under water. Has such an estimate ever been determined by your organization? I would very much appreciate an early reply. C. H. H.

There is not much information available on how long a seal or a sea lion can stay under water. The length of time probably varies with different species.

A. Brazier Howell states in his book, *Aquatic Mammals*, page 318, "I have taken every opportunity to observe seals and sea lions but have never yet seen one submerge for more than a couple of minutes. And yet it seems that at least Boreal seals, which spend much of their time beneath the ice, must very greatly exceed this, say to the extent of at least 10 and very probably 20 minutes."

My own experience, which is rather casual, coincides with that of Dr. Howell. I once timed a California sea lion in Elkhorn Slough, and it never stayed under longer than two minutes. But Dr. G. Dallas Hanna, of our staff, who has made an extensive study of Alaska fur seals, tells me that he has timed them, and that they stay under water from 5 to 10 minutes.

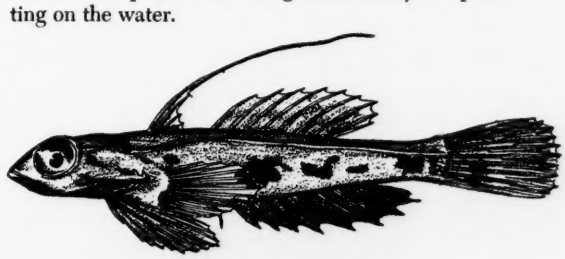
Actually there is no way of telling how long a seal can stay under water. The problem is a little like that of seeing who can lean the farthest out of a window. From the available evidence, it appears that California sea lions come up for air every one or two minutes, and that Alaska fur seals can get along with one good deep breath for five to ten minutes at a time. In a pinch, either one could probably hold out considerably longer. I am sorry – this is one of those questions about which you can't be specific.

Do the higher apes show right-handedness and left-handedness as in humans? E. E.

Among the higher apes (chimpanzee, gorilla, orang-outang) each individual will show a preference for the use of one hand over the other; but right-handedness is not nearly as common as it is in humans.

Something I have often wondered about is where do sea-gulls sleep? R. M. W.

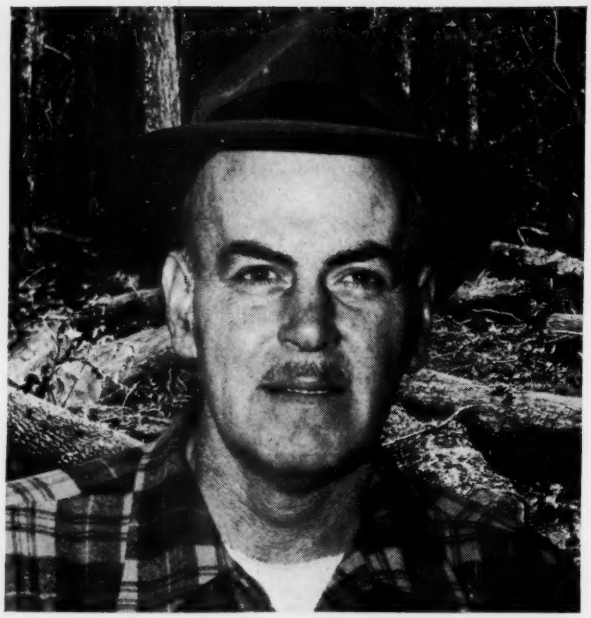
This is a tough one. When I was a graduate student – this was in the good old ferry boat days – I made a protracted study of the flight of sea gulls, and they seemed to follow the boats at all hours of the day and night. I wondered whether they ever slept at all. Subsequently, when standing watches at night aboard the Motorship *Catalyst* in Puget Sound and the inland waters of Alaska, I frequently observed gulls starting up from the water as the ship approached. Since the *Catalyst*, even with me at the wheel, pursued a fairly straight and narrow course, there must have been a lot of sea gulls around there to be started up. It is my considered opinion that sea gulls normally sleep sitting on the water.



Dragonet, *Callionymus rubrovinctus* Gilbert.
(From *Hawaiian Fishes* by Spencer W. Tinker)

Not that there are such things, but if there were, what would be the correct name for a young dragon? Would it be a pup, or a cub, or what? E. L. S.

The correct word for a young dragon – if there were such things – is dragonet. This is confirmed by the *Century Dictionary*, which cites Spencer's *Faerie Queen* in support. Actually there is a group of strange-looking fishes (Family Callionymidae) that is known by this name. R.C.M.



We've been asked...

"What's wrong about integration? It's the way I operate, too!"

Many businessmen have said: "*This 'integration' you big companies are attacked for is just a matter of doing more than one part of a job. So what's wrong about that? It's the way I operate, too!*"

Consider first that "integration" means simply carrying a job through several steps. Integration can't make a good company bad. It's a method any business may use as it competes for your patronage, increasing its efficiency and benefiting you by keeping prices down. Let's compare our method of operation with that of another integrated fuel-producer whose system is centuries old:

A woodcutter goes into a forest and fells trees. Standard drills into the ground and brings up oil. If the woodcutter sells the logs then and there... and if Standard sells the crude oil to some buyer at the well . . . there's no integration. Each has performed only one part of the job.

Now if the woodcutter takes the next step and cuts the logs into fireplace size, he has become an integrated business. Like him, Standard works to turn the product into the forms you use. We refine our crude oil into gasoline, lubricants, fuel oil, and other products. So we're integrated, too.

When the woodcutter hauls a load of firewood he extends his integration. He's now in the transportation business . . . as is Standard when we use our tankers and pipelines to transport oil from well to refinery, and the refined products from there to areas where they'll be used.

And if the woodcutter finally sells the firewood to you, his operation is fully integrated. Ours is, too, when we sell you fuel oil ...or when we sell gasoline through Company-owned service stations. So is integration wrong? Not at all. And we make best use of it to bring you better products at low cost.

STANDARD OIL COMPANY OF CALIFORNIA

• plans ahead to serve you better